

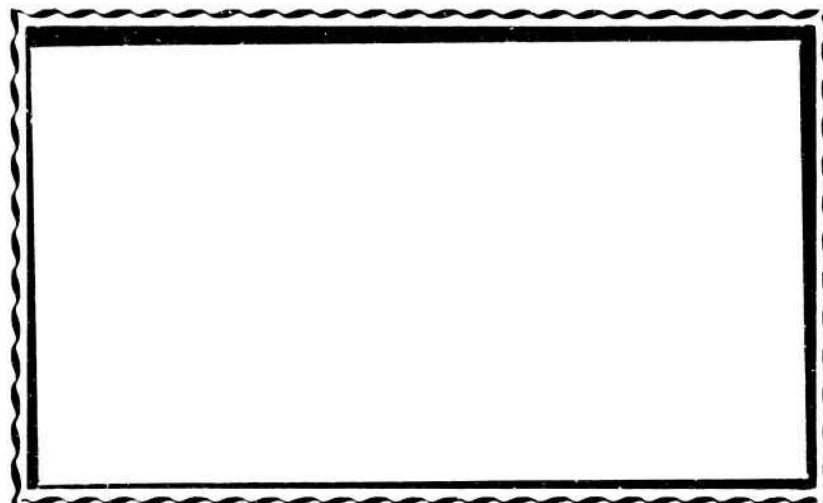
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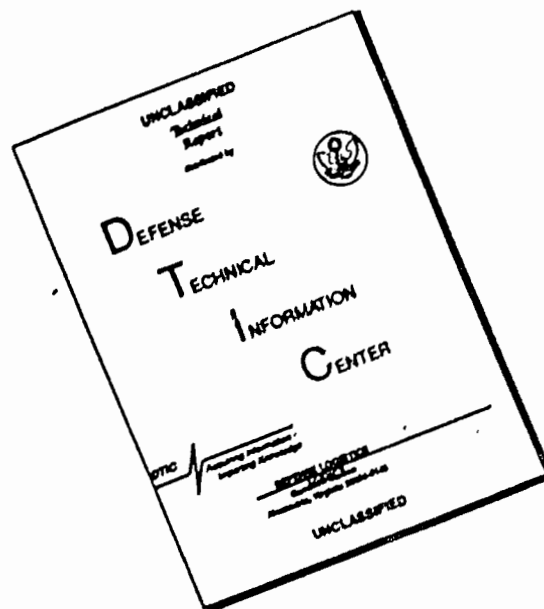


Portsmouth Naval Shipyard  
Portsmouth, New Hampshire



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**PORTSMOUTH NAVAL SHIPYARD  
FACILITIES  
FOR  
NOISE MEASUREMENT AND REDUCTION  
(July 1964)**

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**NOTE:** This Brochure is intended to show only the unclassified permanent facilities and the large mobile facilities. There is available a large quantity of portable equipment for conducting all phases of shipboard and shop testing. Where necessary, evaluation of test results may be made, using statistical, digital or analog techniques which are available within the Shipyard.

**Prepared by 243D  
Noise Projects Section  
Construction Program Area  
Design Division**

1. Portsmouth Acoustic Radiation Measurement Basin. - Eastern end of the Shipyard.

The Portsmouth Acoustic Radiation Measurement Basin (PARMB), photographs 1 and 2, provides a facility for performing overside acoustical sound surveys on year-round basis and can operate 24 hours a day. Ample shore power is available for both fleet type and nuclear submarines. EXtremely quiet ambient noise levels (55-60 DB re 0.0002 Dynes/Cm<sup>2</sup>) exist in the water at the basin. Isolation of this facility from the rest of the Shipyard and normal ship traffic offers ideal conditions for submarine sound testing.

Photograph 2 shows the instrumentation consoles for measuring and recording sound. The automation of instrumentation in these consoles has reduced the manpower requirements for performing a survey by one half and has reduced the time required for performing surveys by one third. This instrumentation provides for simultaneous recording of seven channels of information (e.g. structureborne, airborne or waterborne noise).

2. Underway Instrumentation Hut - Portable

Photograph 3 shows the YTB now used at Portsmouth for conducting underway radiated noise surveys. On the decks are mounted the instrumentation hut and sound isolated diesel generator (photograph 4) used to supply tug and hut power requirements. This hut and generator can be placed on the deck of any large craft for performing underway radiated surveys.

3. Noise Reduction Facility - Building 240

The Noise Reduction Facility is used for analysis (of magnetic tape recordings), calibration, repair and fabrication of instrumentation and storage. This facility has approximately 1700 square feet of floor space. Storage lockers store and protect all portable instruments, magnetic tapes, tools and spare parts. The facility is divided into three sections; analysis, calibration, and repair and fabrication.

**Analysis Section**

The primary function of the facility is the analysis of magnetic tape recordings. Most of the floor space is allocated to this function. The principal instrument of analysis is the AN/FQQ-1 (V), one of the most

sophisticated discrete-frequency analyzers now available.

Discrete-frequency analysis is also possible with the Portsmouth-designed SANFA (Semi-Automatic Narrow-Band Frequency Analyzer). Two SANFA'S are located in this facility. These analyzers have a two-cycles-per-second bandwidth and analyze between 10 and 5000 cycles per second.

The automatic one-third octave-band analyzer is also Portsmouth designed, using a B & K Analyzer. This analyzer uses 8 inch by 10 inch graph paper. Its frequency range is from 12.5 to 44,600 cycles per second; its dynamic range is 60 db. (Photograph 5)

Portable analyzers such as the General Radio Models 1554A, 1564A, and 1558A are also used at this facility.

#### Calibration Section

The calibration section of the facility (photograph 6) has the instrumentation to perform "spot checks" of instruments used in noise measurement.

Regular calibration of electronic instruments is done by the ~~Naval~~ Calibration Standards Laboratory located in the same building as this facility. Hydrophones are sent to USNEWSPEFL in Orlando, Florida for calibration.

#### Repair and Fabrication

The repair and fabrication section of the facility (photograph 7) is equipped to make minor repairs on instrumentation. Spare parts, which include resistors, capacitors, batteries, tubes, transistors, diodes, wire, connectors, etc., are kept here. Any repairs beyond the scope of this section are accomplished in the Electronic Shop's Instrumentation Repair Section. (Shop 67).

Fabrication projects done in this facility included the two SANFA's, the automatic one-third octave band analyzers, and the console for PARMB.

#### 4. Mechanical Impedance Instrumentation Enclosure - Mobile

This instrumentation, designed and built at the Portsmouth Naval Shipyard, is used for the analysis of vibration problems based on the structural properties of the vibrating system. The instrumentation plots the complex ratio of applied force to system response, or mechanical impedance, which may then be used to determine the dynamic properties of the system. The instrumentation is housed in a portable enclosure for transportation to dockside or other test sites. See photographs 8 and 9.

### **5. Instrumentation Trailer - Mobile**

**717:** This vehicle is owned and maintained by the Noise Projects Group at Portsmouth Naval Shipyard for performing special dockside sound tests. (Photograph 10). The trailer is a mobile vehicle in which airborne, structureborne and waterborne noise can be recorded or analyzed directly. This trailer can be utilized for shop noise testing as well as for ship-board noise tests at production piers.

### **6. Electrical Shop Facilities - Building 240**

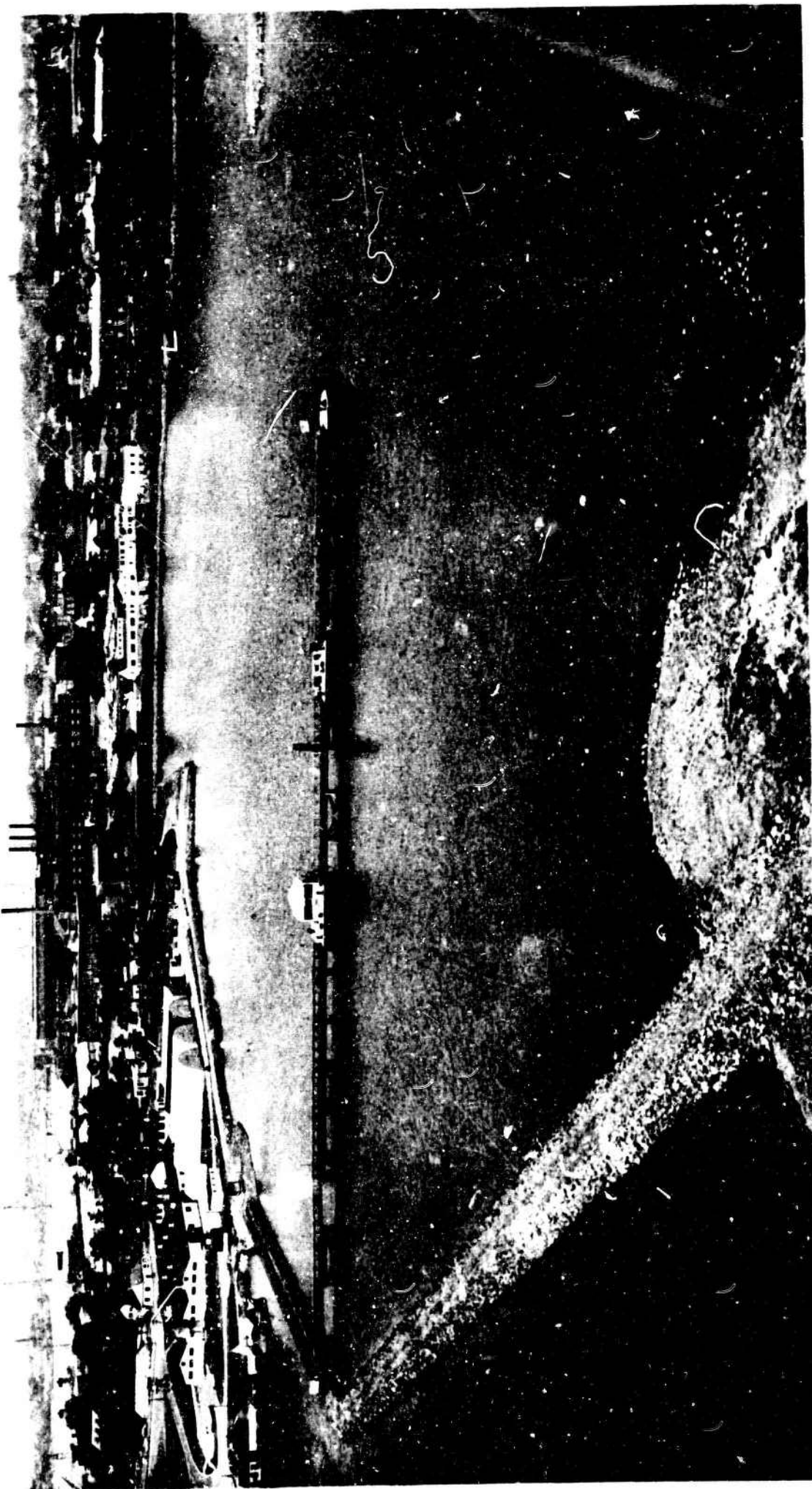
The Electrical Shop has the following noise facilities: ball bearing inspection and motor assembly area, element dynamic balancing area, and assembly balancing and noise test area.

The ball bearing inspection and motor assembly area provides the necessary controlled environment for this precision work. It is divided into three parts: The bearing cleaning area where bearings are washed in detergents and rinsed in alcohol baths prior to inspection is shown in photograph 12, the bearing inspection area where bearings are sized, graded for their noise characteristics, and packaged in clear plastic, is shown in photographs 13 and 14, and the motor assembly area where bearings are installed is shown in photograph 15. A ~~heavy~~ sealed in clear plastic is shown in photograph 16.

All rotating elements are statically and dynamically balanced prior to assembly. The dynamic balancing of a propeller is shown in photograph 17.

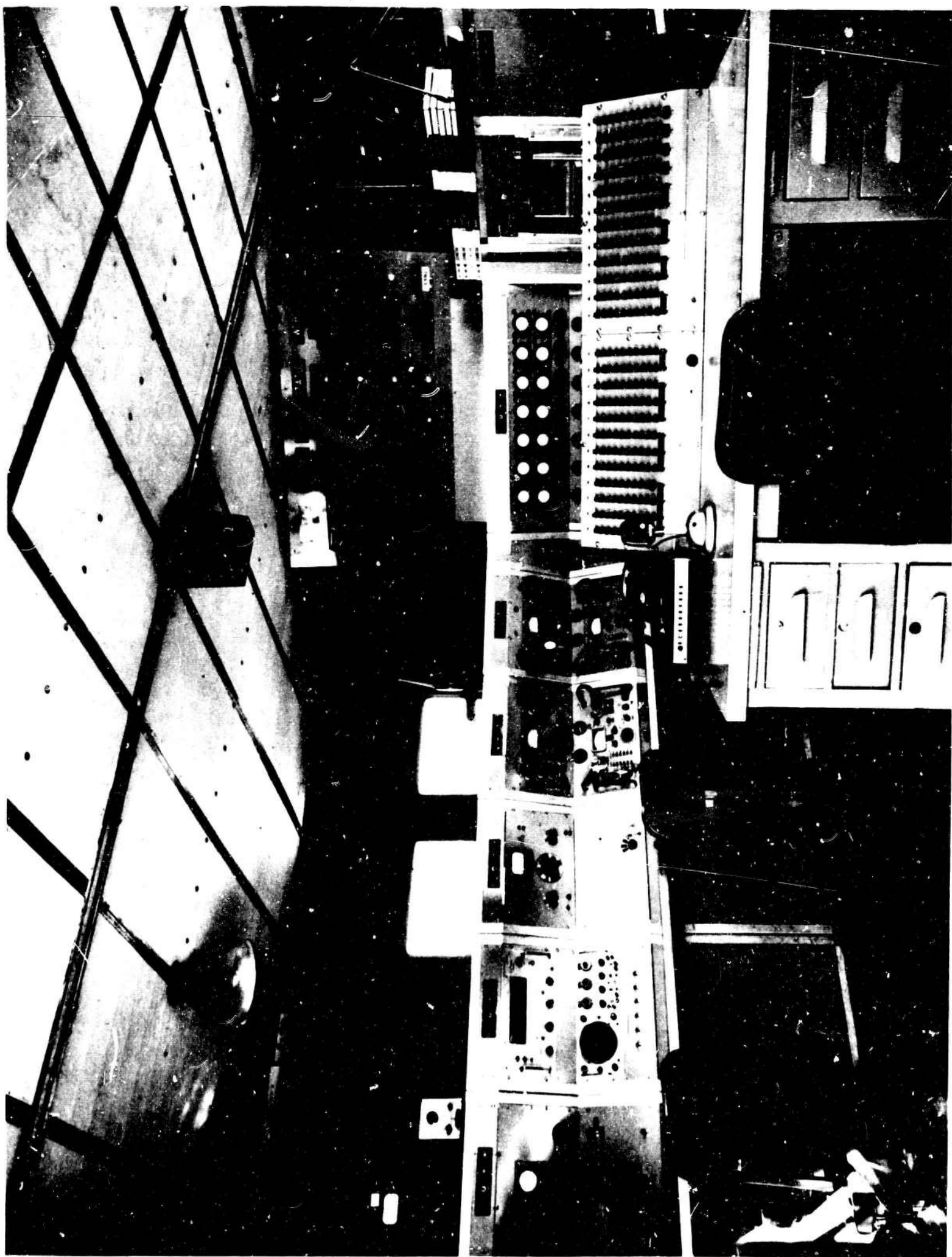
After assembly, motors, motor-generators, and fans are tested for noise performance in the area shown in photograph 18. Where necessary these units are dynamically balanced as assembled components in order to meet specified noise levels.

A pre-installation test facility for the testing of all other noisy items such as pumps and compressors is in the design stages.

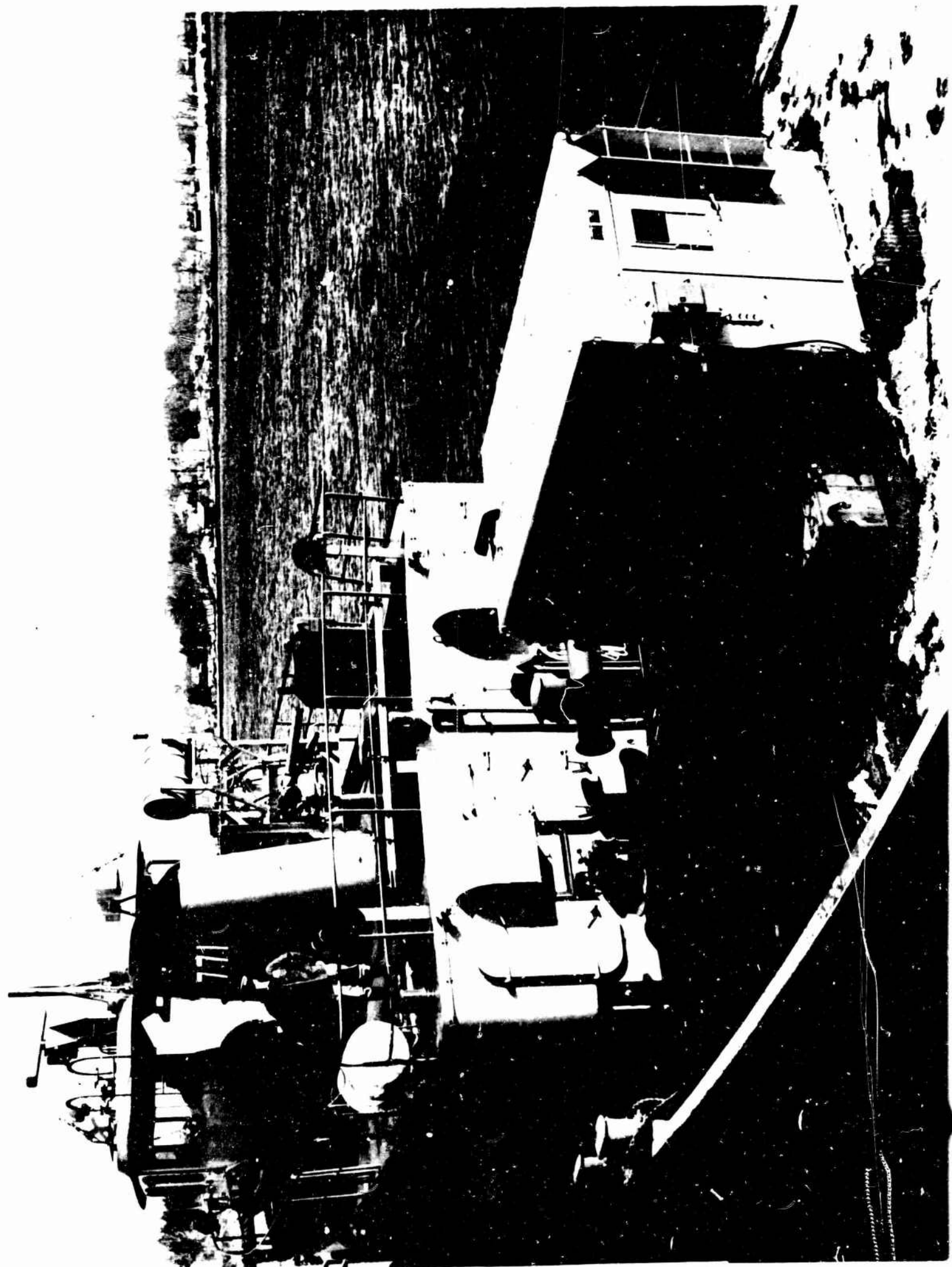


Photograph 1 PARMB

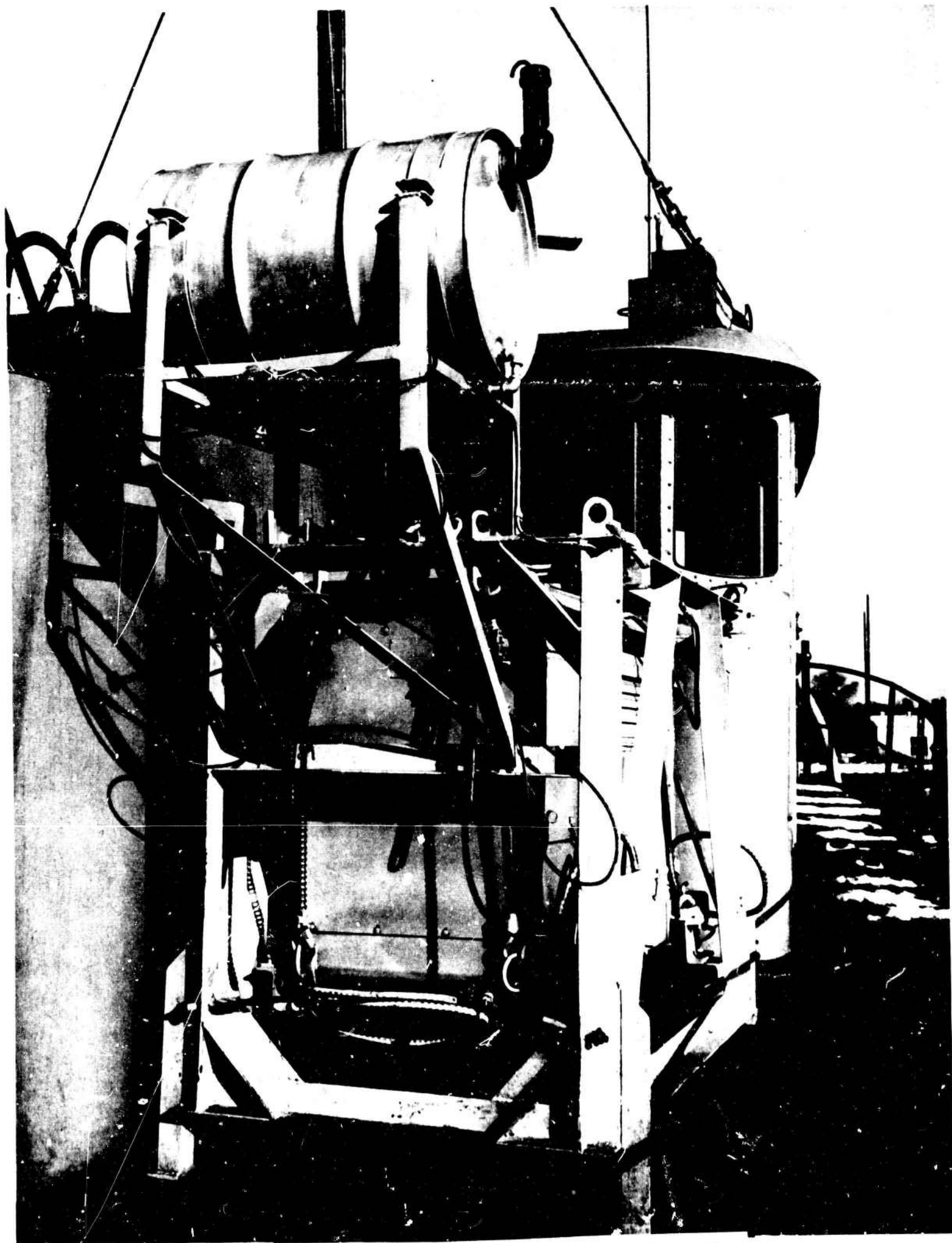




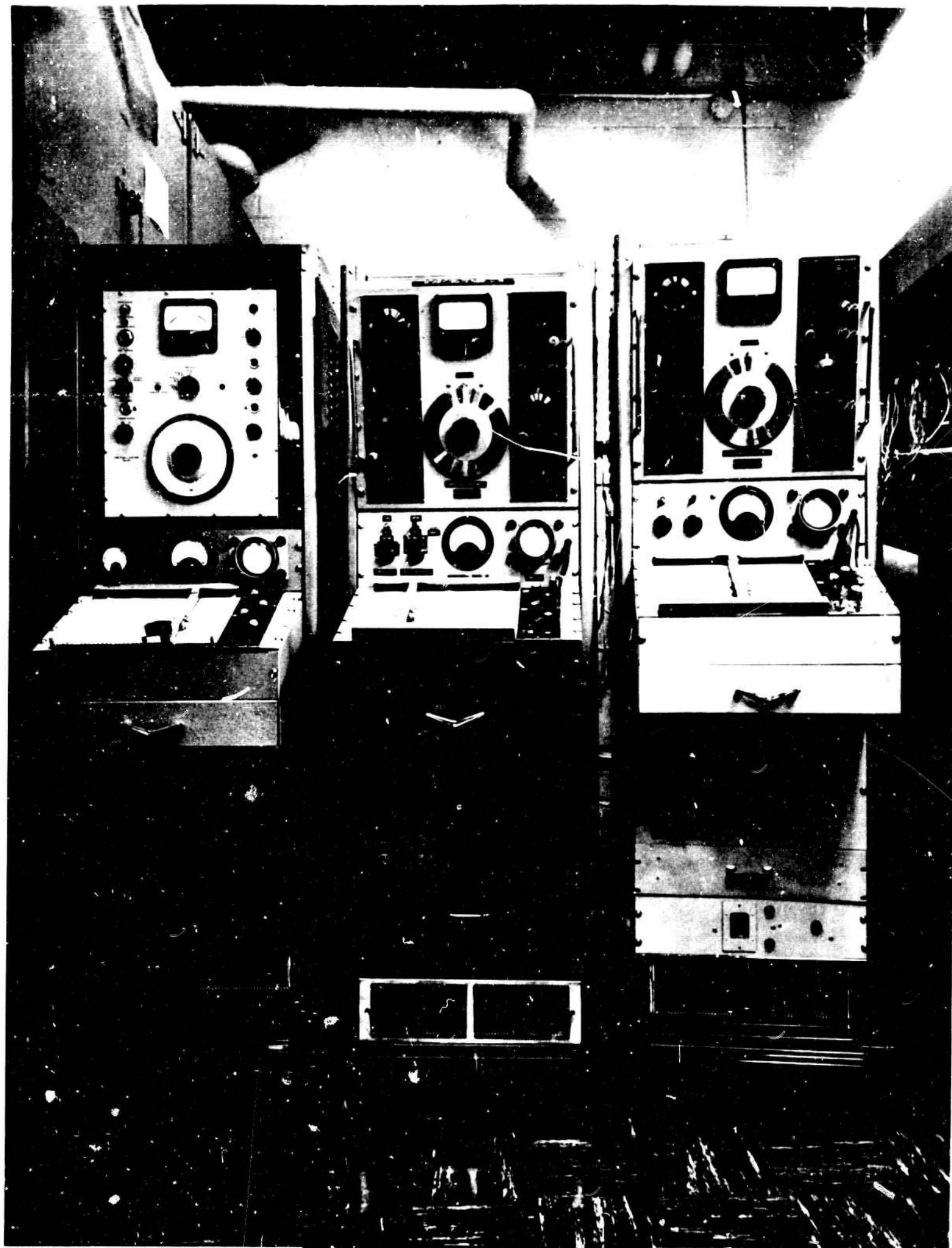
Photograph 2 PARMB Equipment console



Photograph 3 YTB 771 and Instrumentation Hut

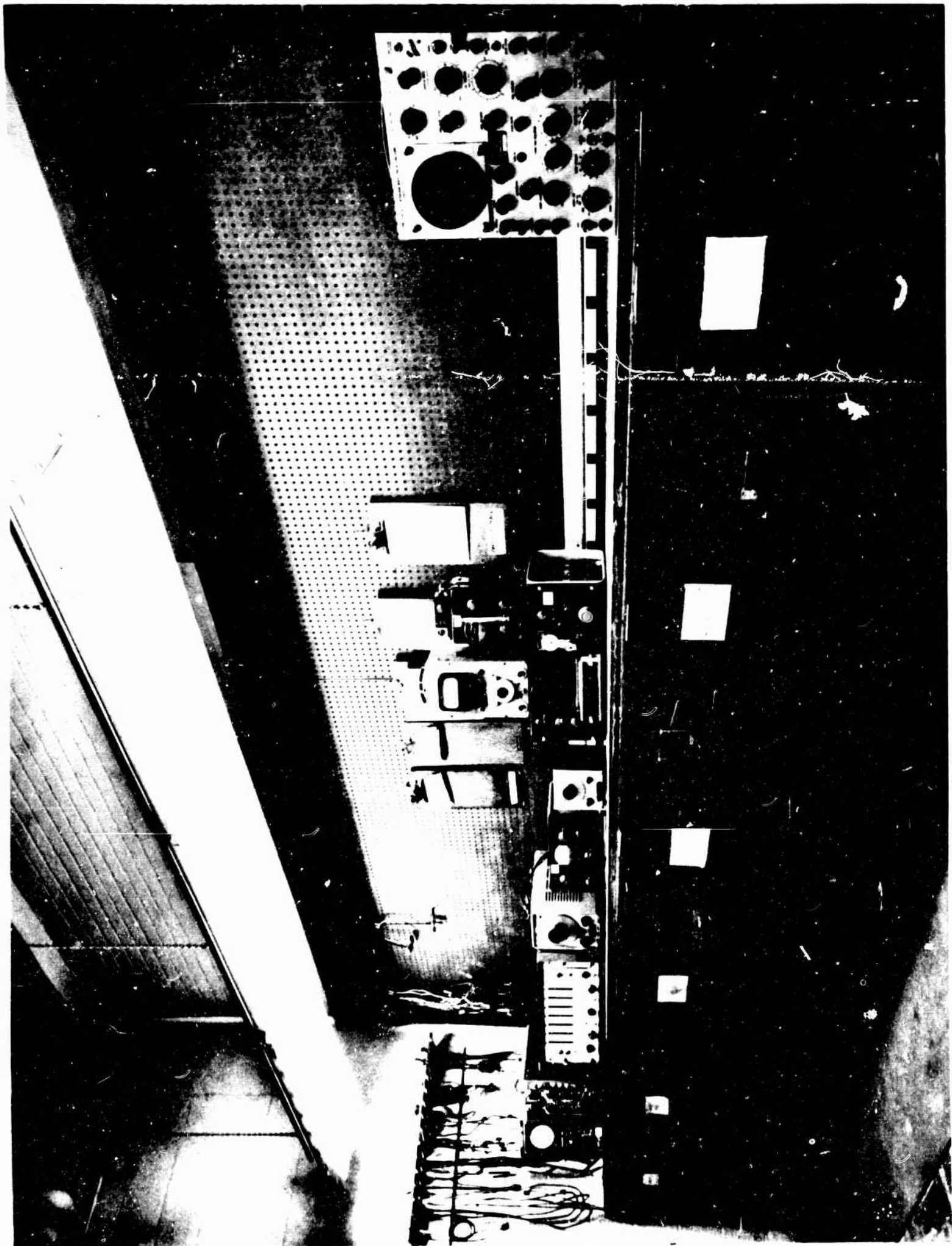


Photograph 4 Sound Isolated Diesel Generator



Photograph 5 Analysis Equipment

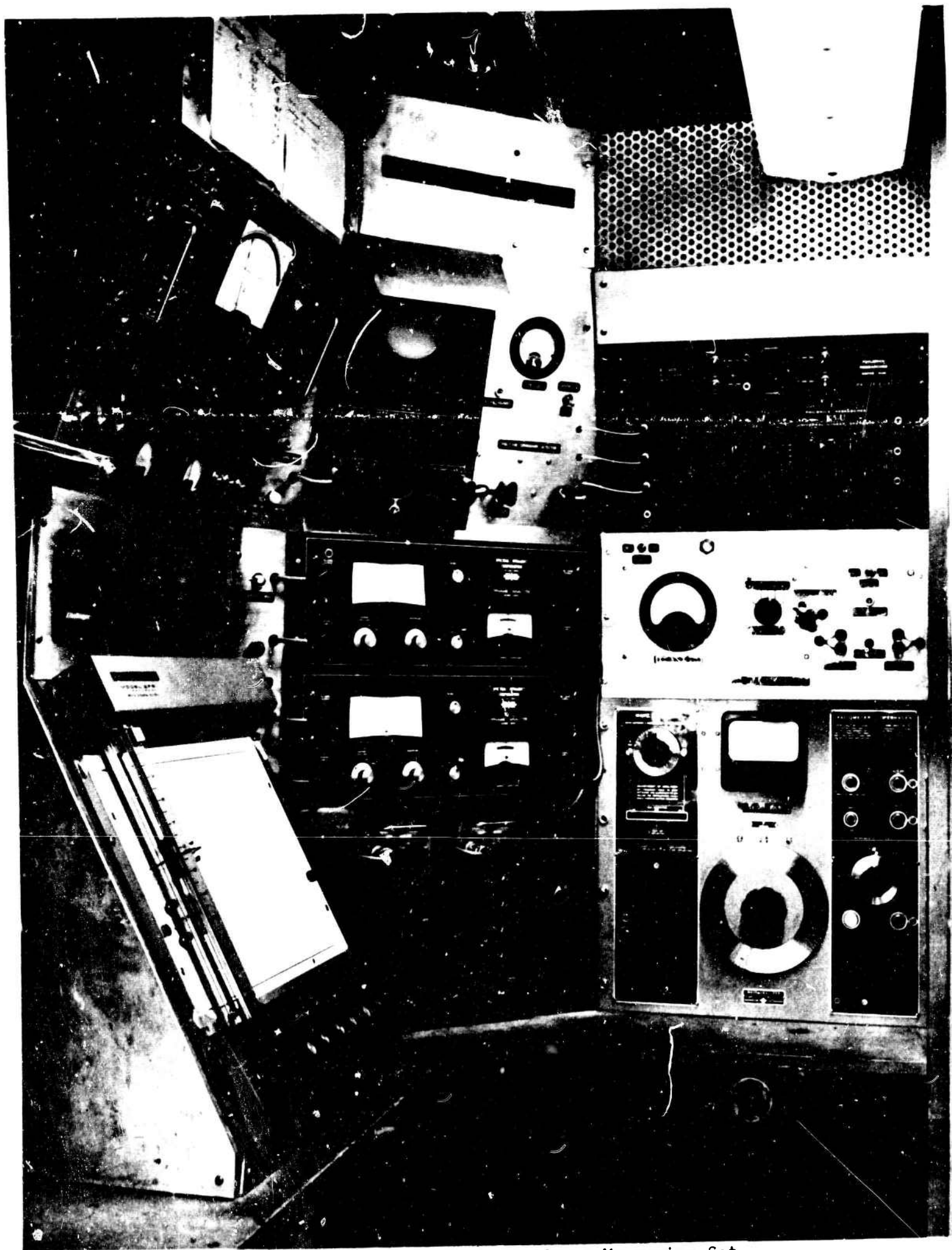




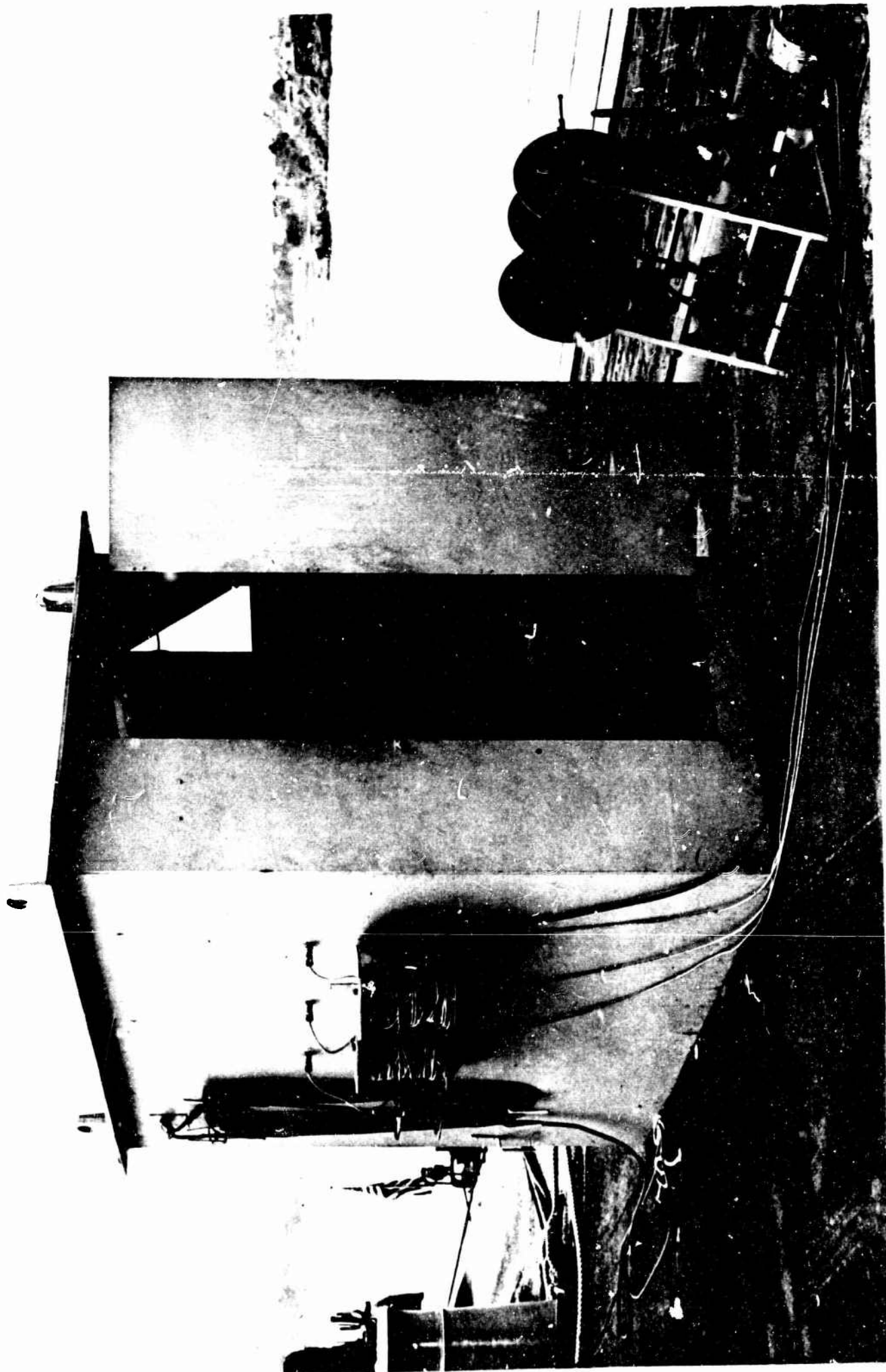
Photograph 6 Calibration Equipment



Photograph 7 Equipment Maintenance Area

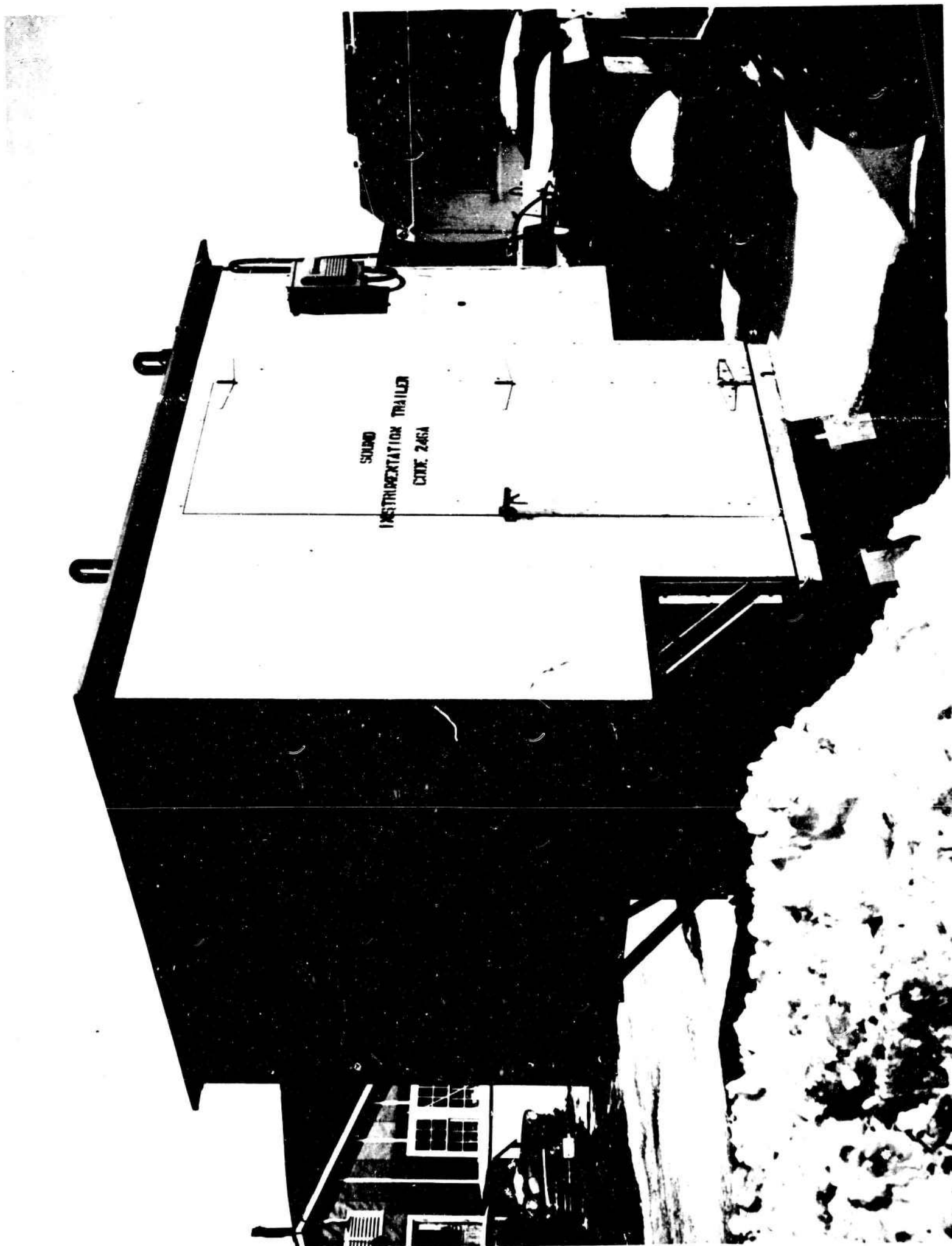


Photograph 8 Mechanical Impedance Measuring Set

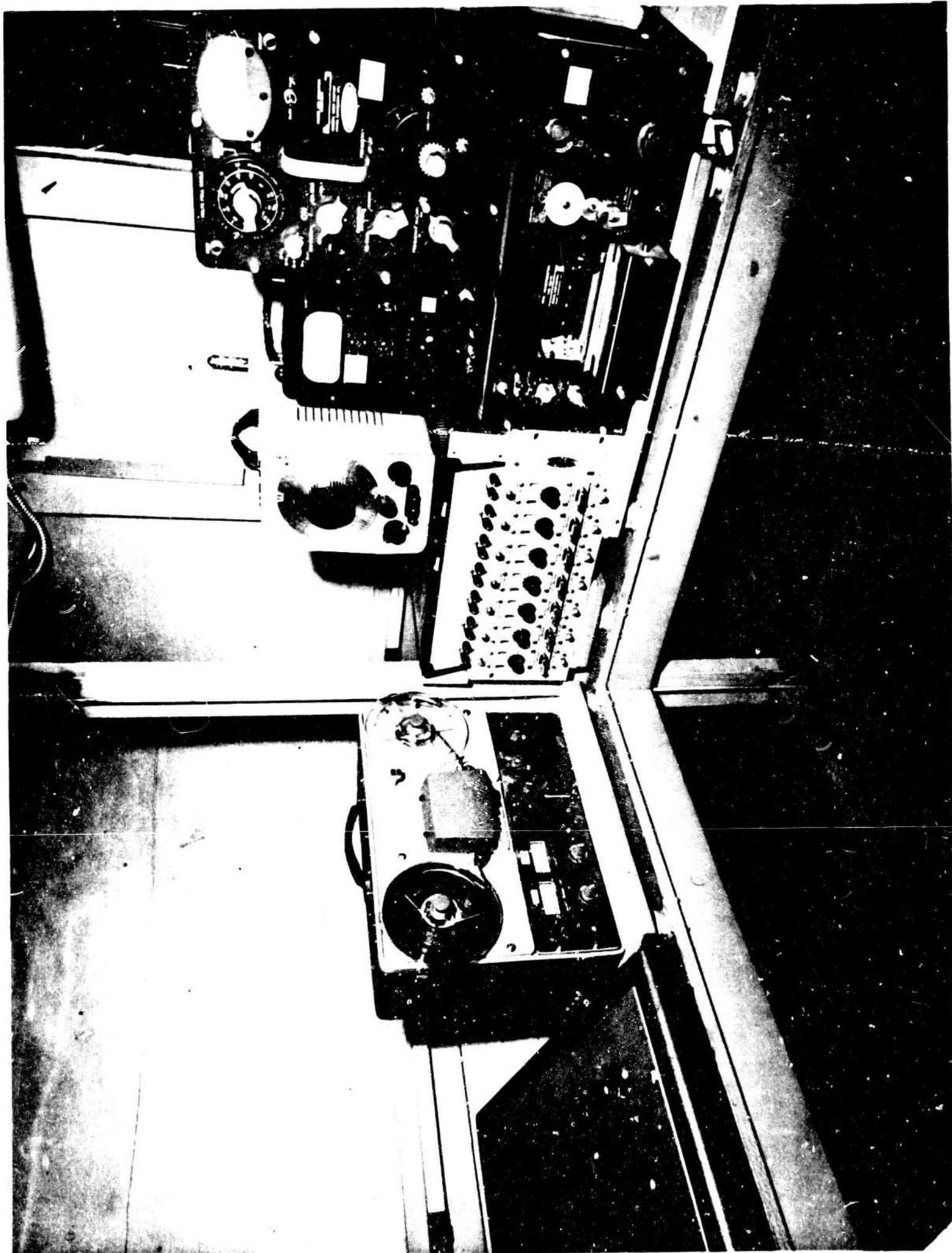


Photograph 9 Mechanical Impedance Instrumentation Enclosure

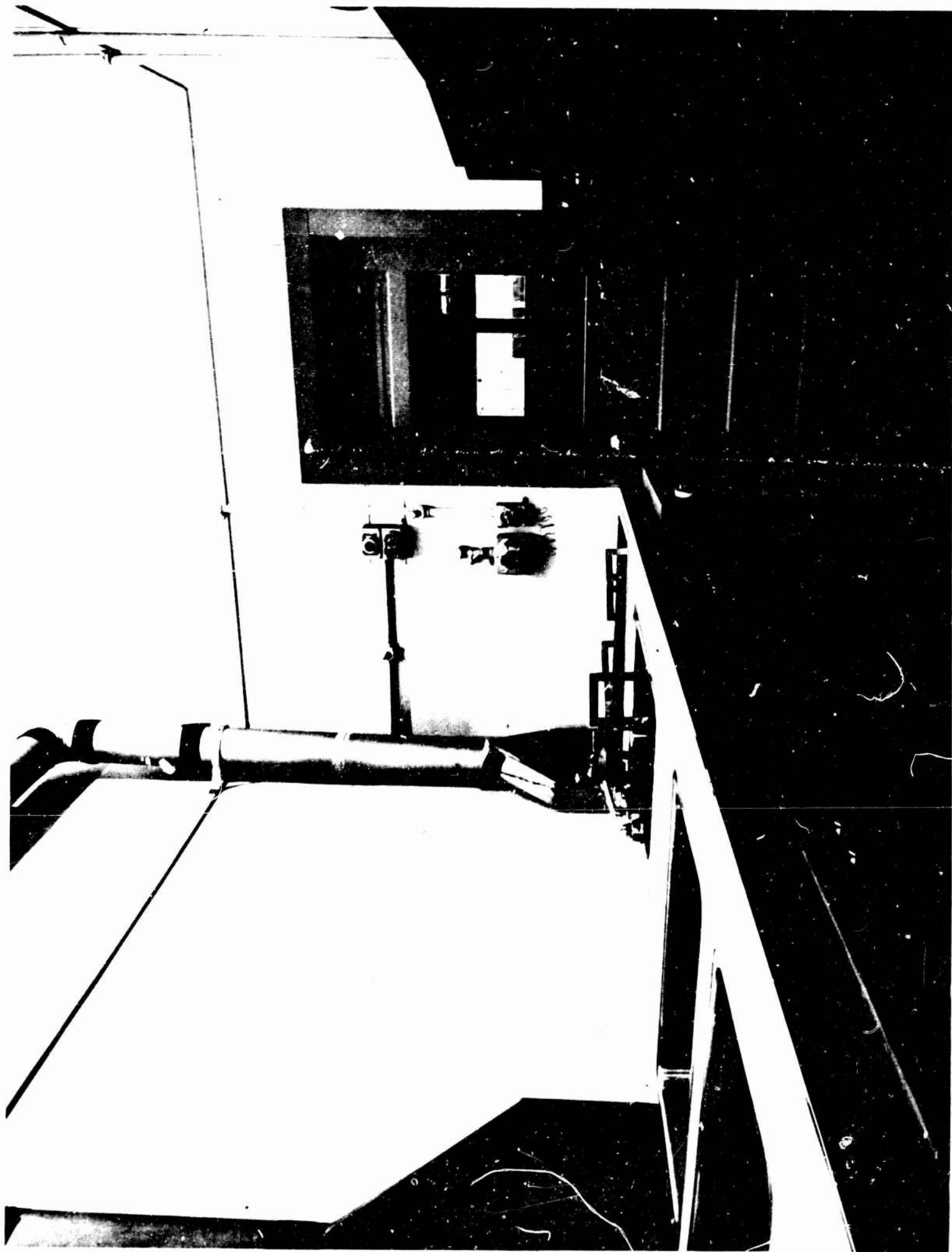




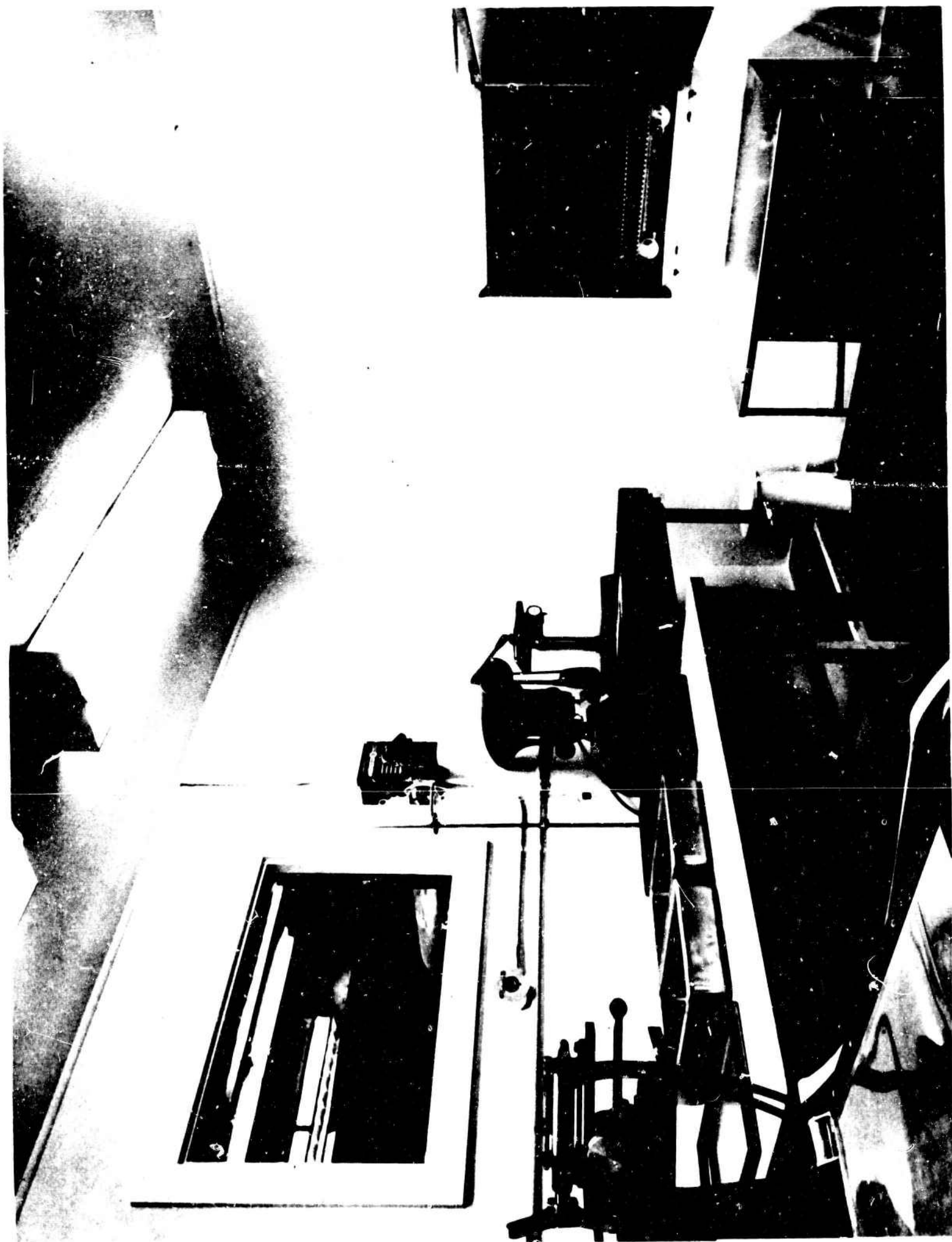
Photograph 10 Instrumentation Trailer



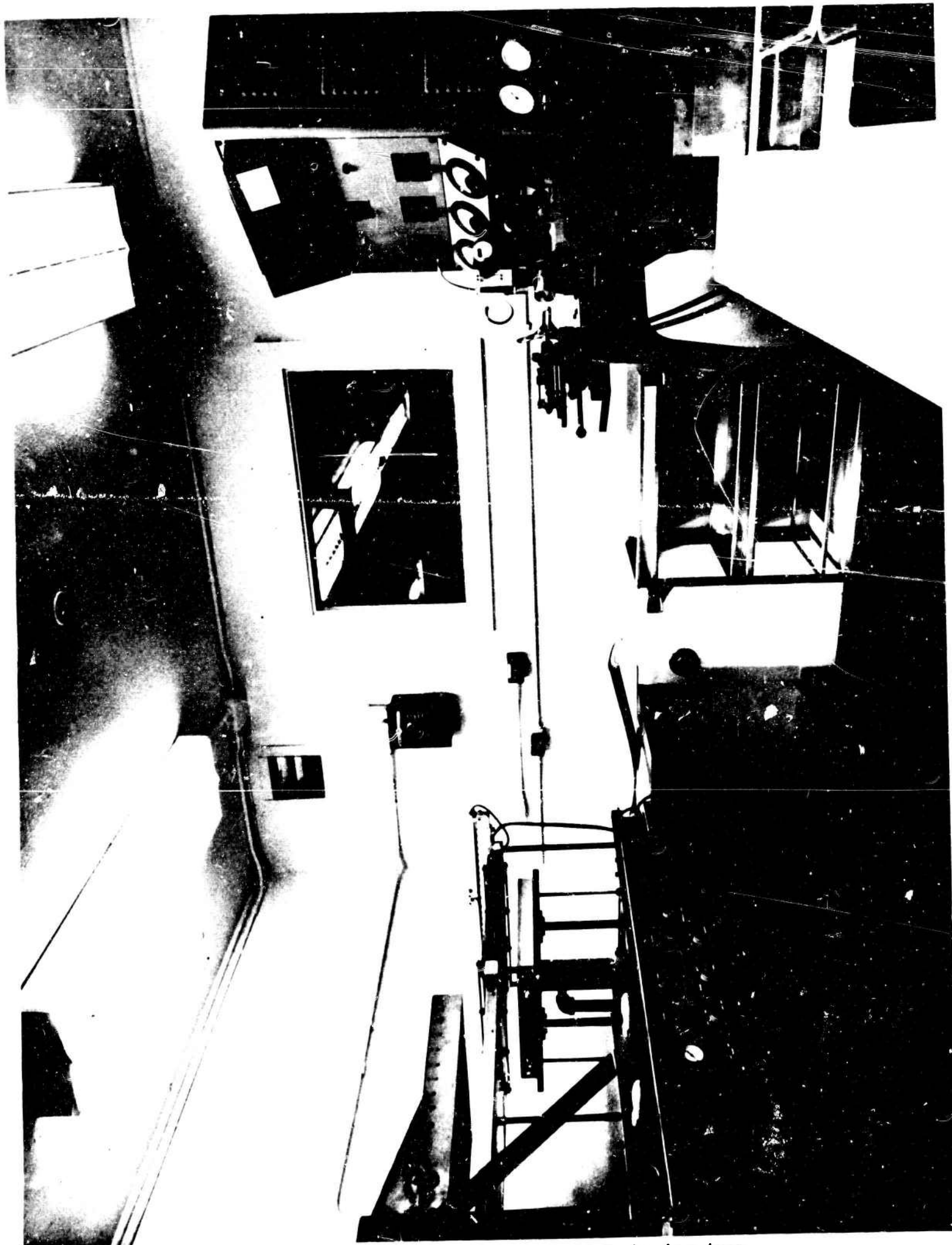
Photograph 11 Interior of Instrumentation Trailer



Photograph 12 Bearing Washing Area



Photograph 13 Bearing Grading and Packaging Area

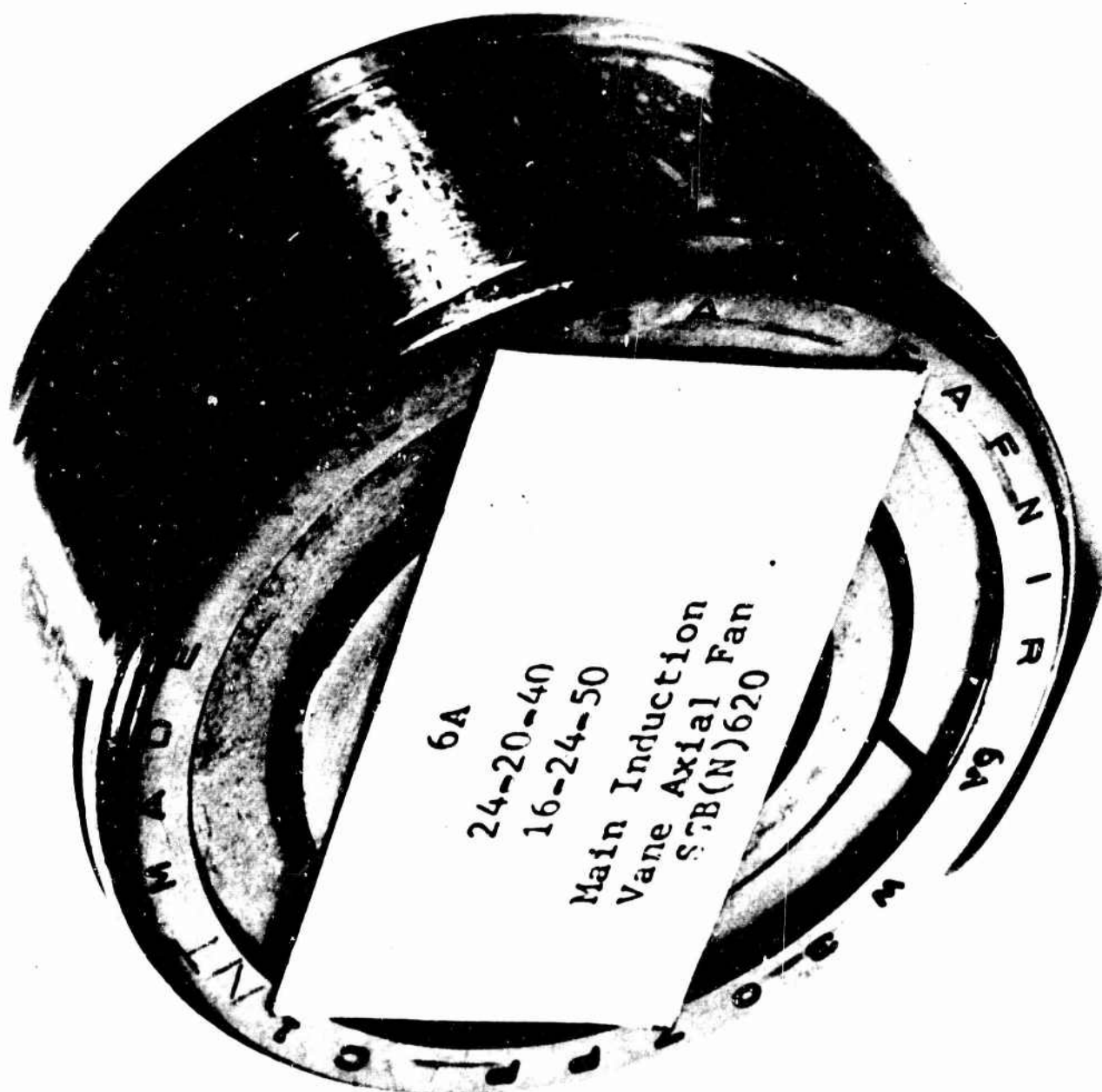


Photograph 14 Bearing Grading and Packaging Area

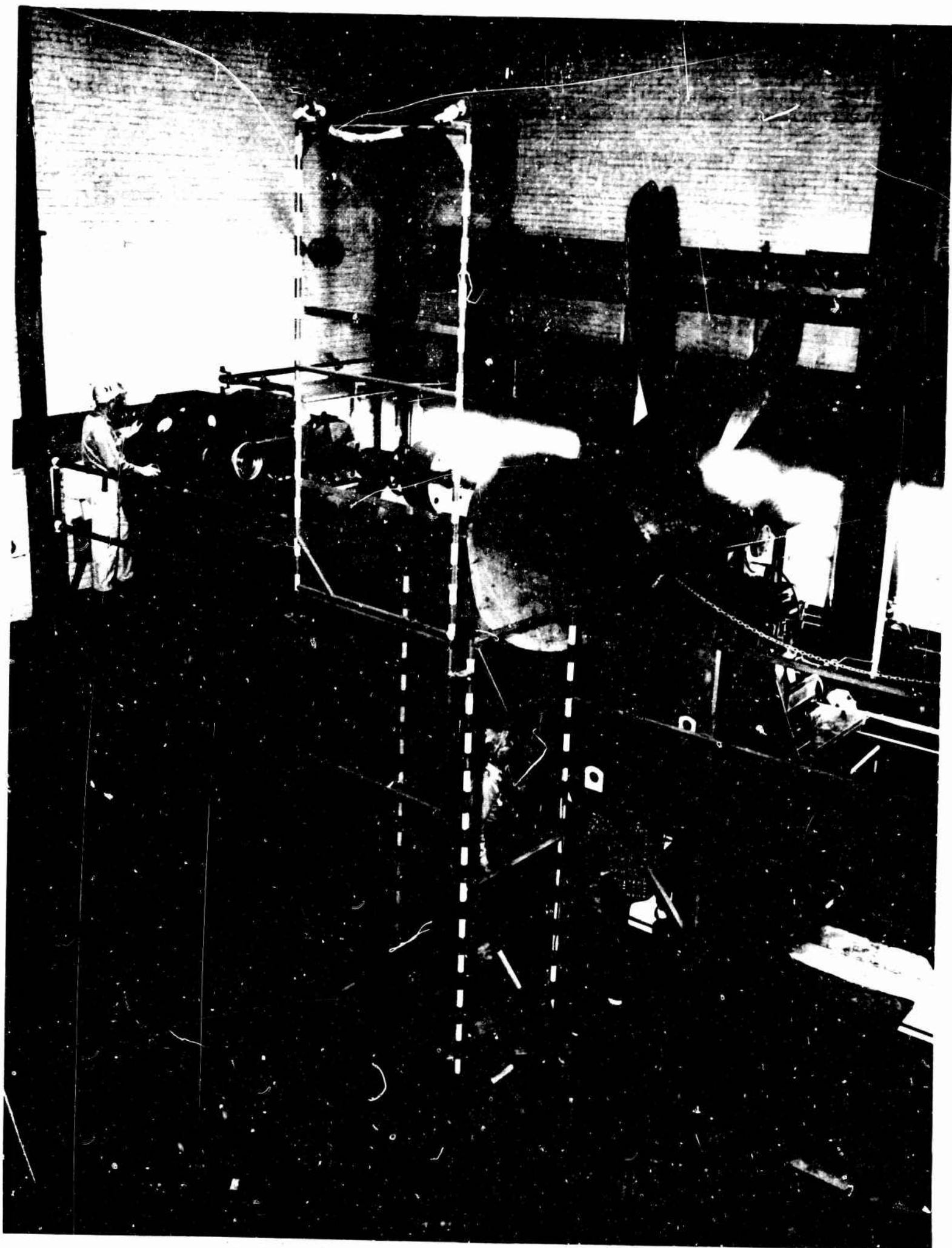




Photograph 15 Bearing Installation Area

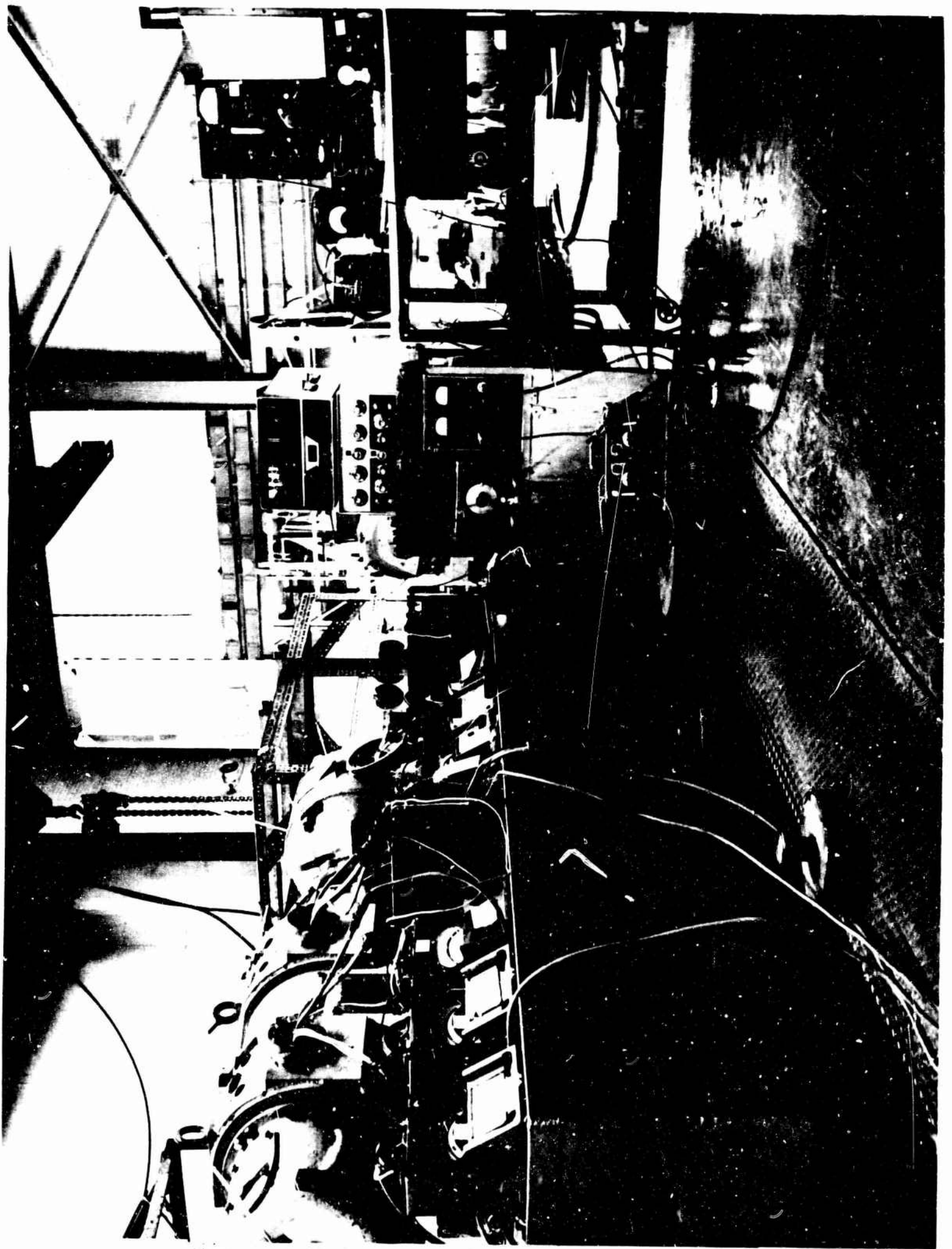


Photograph 16 Plastic Sealed Bearing



Photograph 17 Dynamic Balancing of a Propeller





Photograph 18 Shop test facility for noise performance